Electricity & Magnetism

USSR

AKHIYEZER, A. I., AKHIYEZER, I. A. (Khar'kov State University)

"On the Possibility of Spin Wave Excitation in Magnetic-Ordered Ferroelectric Substances"

Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, September 1970, pp 1009-1014

Abstract: Excitation of spin waves in ferroelectric magnetic-ordered crystals is investigated. It is shown that such a crystal is also a semiconductor, excitation of spin waves by an external stationary electric field should be possible. The mechanism of such excitation is different in principle from well-known mechanism of excitation of spin waves by an electric field in ordinary (non-ferroelectric) magnetic-ordered semiconductors and should lead to considerably greater increments.

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AKHIYEZER, I. A., et al, Pis'ma v Zhurnal Eksperimental'noy i
Teoreticheskoy Fiziki, Vol 11, No 11, 5 June 1970, pp 557-559

then uses the ordinary method of superconductivity theory to
obtain expressions for the Fourier components of the correlation
functions of the nucleon density ($\psi^{(0)}$) and isospin density
($q^{(i)}$). It is pointed out that the isotopic structure of the
correlation functions obtained differs appreciably from the
isotopic structure of the correlation functions in the ordinary
(two-fluid) superconducting model of the nucleus in which the
correlation of the superconducting type occurs only between
particles of one variety. This difference between the quasi-
fluid and quasideuteron models of the nucleus can be essentially
exhibited in a number of processes of interaction of particles
with nuclei. Graphs are presented which clearly show that in
the case of pairing of the quasideuteron type the scattering
cross section has an essentially different nature than in the
case of pairing of the two-fluid type.

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USSR

AKHIYEZER, I. A., BARTS, B. I., BOLOTIN, YU. L.

"Proton-Neutron Correlation in Medium and Heavy Nuclei"

Abstract: In the light of possible equality of the chemical
potential of neutrons and protons, it is of interest to consider
the question of the consequences of proton-neutron (pn) pairing.
In this paper it is demonstrated that this pairing essentially
changes (by comparison with ordinary pp and nn pairing) the
isotopic structure of the correlation functions of the nucleons
of the nucleus. The author begins his analysis with the hamil-
tonian

$$H' = -\Sigma I a^{i_1+}_{p_1 s_1} \, a^{-i_1+}_{-p_1 s_1} \, a^{-i_2}_{-p_2 s_2} \, a^{i_2}_{p_2 s_2} \; :$$

where a^{i}_{ps}, a^{i+}_{ps} are the operators of destruction and generation
of a nucleon with the pulse p, the spin projection s, and the
isospin projection i; and I is the interaction potential, which
is nonzero in a narrow energy range near the Fermi range. He
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USSR

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U.C: None

AKHIYEZER, I. A., BOLOTIN, YU. L., and SPOL'NIK, E. A., Physico-Technical Insti-
tute of the Ukrainian Academy of Sciences, Kharkov (Fiziko-Tekhnicheskiy insti-
tut AN USSR, Khar'kov)

"Coherent Excitation of Oscillation by Particle Fluxes in Ferromagnetics with Low
Magnetic Anisotropy"

Abstract: The authors determine the condition for the coherent excitation of
coupled oscillation by particle fluxes in ferromagnetics with low effective aniso-
tropy. The growth increment for the oscillations is also determined. The results
show that the growth increment is significantly larger than encountered in ordin-
ary ferromagnetics. This is explained by the fact that long-wave oscillations
are excited in crystals with low effective magnetic anisotropy. As a consequence,
the coupling parameter b is large and is proportional to the square of the wave-
length.

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USSR

AKHIEZER, I. A.; BOLOTIN, Yu. L.; SPOL'NIK, Z. A. (Physics-Engineering Institute of the Ukrainian Academy of Sciences, Khar'kov)

"Coherent Excitation of Oscillations by Streams of Particles in Ferromagnetics with Small Magnetic Anisotropy"

Kiev, Ukrainskiy Fizicheskiy Zhurnal; March, 1970; pp 433-7

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ABSTRACT: The coherent excitation of coupled magnetoacoustical oscillations in ferromagnetic crystals near the critical point, in which the character of the magnetic anisotropy changes, is investigated. The increments of the increase in the oscillations are determined. It is shown that these increments can be considerably larger than the increments of the increase of spin waves in ordinary ferromagnetics.

The article includes 14 equations. There are 4 references.

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1/3 · 022 UNCLASSIFIED PROCESSING DATE--04DEC70
TITLE--STATE OF PERIPHERAL BLOOD CIRCULATION IN PERSONS BEING FOR A LONG
   TIME IN AN OPEN TYPE SUBMARINE LABORATORY, HABITAT -U-
AUTHOR-(04)-AKHLAMOV, YE.A., GULYAR, S.O., GERASYUTENKO, YE.I., KHAES,
   O.A.
COUNTRY OF INFO--USSR

SOURCE--FIZIOLOGICHNYY ZHURNAL, AKADEMIYA NAUK UKRAINS'KOI RSR, 1970, VOL
   16, NR 1, PP 115-120
DATE PUBLISHED-------70

SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES

TOPIC TAGS--BLOOD CIRCULATION, PERIPHERAL CIRCULATION, AQUANAUT,
   UNDERWATER RESEARCH LABORATORY, ATMOSPHERIC HUMIDITY, ATMOSPHERIC
   TEMPERATURE/(U)IKHTIANDR UNDERWATER LABORATORY

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--3007/1369   STEP NO--UR/0238/70/016/001/0115/0120

CIRC ACCESSION NO--AP0136728
                           UNCLASSIFIED

USSR

UDC 517.5

AKHIYEZER, N. I., RONKIN, L. I.

"Separately Analytical Functions of Many Variables and 'Wedge Point' Theorems"

Abstract: In this article the Bernstein method [S. Bernstein, Sur l'ordre de la meilleure approximation des fonctions continués par des polynomes de degré donné, Bruxelles, 1912] is used to obtain some propositions related to the Bernstein theorem belonging to other authors, as well as some new results. Another problem is investigated pertaining to the group of theorems of modern theory of functions of many variables, significant also with respect to applications to quantum field theory. These are the so-called "wedge point" theorems, the first of which was proved by Bogolyubov [N. N. Bogolyubov, et al., Voprosy teorii dispersionnykh sootnosheniy, Moscow, Fizmatgiz, 1958].
      The discussion includes the holomorphic continuation of functions with the product of two neighborhoods, the holomorphic continuation of a function with the product of real axes, the relation of the Bernstein theorem to the wedge point theorems, removal of the assumption of boundedness of separate continuation, and some generalizations.

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USSR

AKHIYEZER, I. A., LAZURIK-EL'TSUFIN, V. T., Physicotechnical Institute,
Academy of Sciences of the UkrSSR, Khar'kov

"On Excitation of Ultrasound in Metals by a Beam of Charged Particles"

Abstract: The authors investigate the excitation of ultrasound in
metal plates by beams of charged particles in accordance with the dynamic
load mechanisms. As the beam is dissipated and decelerated by the solid
material of the plate, it transmits momentum to the metal atoms and thus
sets up a body force or pressure, causing acoustic oscillations. The longi-
tudinal load (with respect to the incident beam) is calculated for cases of
electron (positron) and proton beams. Exact formulas are derived for thick
and thin targets. The results of numerical calculations of pressure are
graphed for plates 0.01 cm thick.

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Electricity & Magnetism

USSR

AKHIYEZER, A. I., AKHIYEZER, I. A. (Khar'kov State University)

"On the Possibility of Spin Wave Excitation in Magnetic-Ordered Ferroelectric Substances"

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Abstract: Excitation of spin waves in ferroelectric magnetic-ordered crystals is investigated. It is shown that such a crystal is also a semiconductor, ex- citation of spin waves by an external stationary electric field should be possible. The mechanism of such excitation is different in principle from well-known mechanism of excitation of spin waves by an electric field in ordinary (non- ferroelectric) magnetic-ordered semiconductors and should lead to considerably greater increments.

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USSR

AKHIYEZER, I. A., et al, Pis'ma v Zhurnal Eksperimental'noy i
Teoreticheskoy Fiziki, Vol 11, No 11, 5 June 1970, pp 557-559

then uses the ordinary method of superconductivity theory to
obtain expressions for the Fourier components of the correlation
functions of the nucleon density ($\phi(0)$) and isospin density
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correlation functions obtained differs appreciably from the
isotopic structure of the correlation functions in the ordinary
(two-fluid) superconducting model of the nucleus in which the
correlation of the superconducting type occurs only between
particles of one variety. This difference between the quasi-
fluid and quasideuteron models of the nucleus can be essentially
exhibited in a number of processes of interaction of particles
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cross section has an essentially different nature than in the
case of pairing of the two-fluid type.

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USSR

AKHIYEZER, I. A., BARTS, B. I., BOLOTIN, YU. L.

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Moscow, Pis'ma v Zhurnal Eksperimental'noy i Teoreticheskoy
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the question of the consequences of proton-neutron (pn) pairing.
In this paper it is demonstrated that this pairing, essentially
changes (by comparison with ordinary pp and nn pairing) the
isotopic structure of the correlation functions of the nucleons
of the nucleus. The author begins his analysis with the Hamil-
tonian

$$H' = -\Sigma I a^{i_1+}_{p_1 s_1} a^{-i_1+}_{-p_1 s_1} a^{-i_2}_{-p_2 s_2} a^{i_2}_{p_2 s_2} :$$

where a^i_{ps}, a^{i+}_{ps} are the operators of destruction and generation
of a nucleon with the pulse p, the spin projection s, and the
isospin projection i; and I is the interaction potential, which
is nonzero in a narrow energy range near the Fermi range. He

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USSR

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AKHIYEZER, I. A., BOLOTIN, YU. L., and SPOL'NIK, Z. A., Physico-Technical Institute of the Ukrainian Academy of Sciences, Kharkov (Fiziko-Tekhnicheskiy institut AN USSR, Khar'kov)

"Coherent Excitation of Oscillation by Particle Fluxes in Ferromagnetics with Low Magnetic Anisotropy"

Abstract: The authors determine the condition for the coherent excitation of coupled oscillation by particle fluxes in ferromagnetics with low effective anisotropy. The growth increment for the oscillations is also determined. The results show that the growth increment is significantly larger than encountered in ordinary ferromagnetics. This is explained by the fact that long-wave oscillations are excited in crystals with low effective magnetic anisotropy. As a consequence, the coupling parameter b is large and is proportional to the square of the wavelength.

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USSR

AKHIYEZER, I. A.; BOLOTIN, Yu. L.; SPOL'NIK, Z. A. (Physics-Engineering Insti-
tute of the Ukrainian Academy of Sciences, Khar'kov)

"Coherent Excitation of Oscillations by Streams of Particles in Ferromagnetics
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ABSTRACT: The coherent excitation of coupled magnetoacoustical oscillations
in ferromagnetic crystals near the critical point, in which the character of
the magnetic anisotropy changes, is investigated. The increments of the in-
crease in the oscillations are determined. It is shown that these increments
can be considerably larger than the increments of the increase of spin waves
in ordinary ferromagnetics.

The article includes 14 equations. There are 4 references.

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USSR

AKHIYEZER, I. A., et al., Journal of Nuclear Physics; January, 1970: pp 168-77

The authors express their gratitude to A. I. Akhiyezer for his valuable
discussion of the work.

The article includes 36 equations. There are 8 bibliographic references.

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USSR

A

AKHIYEZER, I. A.; BARTS, B. I. (Khar'kov State University)

"Theory of Fluctuations and Scattering of Slow Pions in Nuclear Matter"

Moscow, Journal of Nuclear Physics; January, 1970; pp 168-77

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ABSTRACT: The fluctuations of "nuclear matter" in the Fermi-liquid model, taking into account the strictly nuclear as well as the electrical interaction among nucleons, are studied. It is shown that the electrical forces essentially modify the nature of long-wave fluctuations in the densities of the nuclear matter and charge. In particular, in the expressions for correlators of fluctuations of given magnitudes sharp maximums occur, caused possibly by the propagation of coupled oscillations of density and the density of the charge in the nuclear matter. The effect of electrical forces on the scattering of slow pions by nuclei is studied. In addition, the electrical interactions of incident pions with protons of the nucleus as well as the electrical interactions among the nucleons of the nuclear matter itself are studied. It is shown that the electrical forces must also be considered along with the nuclear forces if the momentum transfer does not exceed 30 Mev/c.

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USSR

AKHIYEZER, I. A., and DAVYDOV, L. N., Fizika Tverdogo Tela, No 11, Nov 70, pp 3171-3174

far from and in the neighborhood of electromagnetic-spin resonance is obtained. Close to the point of electromagnetic-spin resonance, instead of two branches of strictly electromagnetic waves and two (or one) activation branches of spin waves, there are four (or two) branches of coupled electromagnetic-spin oscillations.

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USSR

AKHIYEZER, I. A., and DAVYDOV, L. N., Khar'kov State University imeni A. M. Gor'kiy

"Coupled Electromagnetic-Spin Waves in Magnetically Ordered Ferroelectrics"

Abstract: Coupled electromagnetic-spin waves in ferroelectric antiferro-magnetics characterized by mixed (magnetoelectric and electromagnetic) susceptibilities in addition to electric and magnetic susceptibilities are studied. It is pointed out that a considerable number of ferroelectric magnetically ordered crystals are now known: antiferromagnetics and weak ferromagnetics. In these crystals the coupling between spin waves and strictly electromagnetic waves should be of a somewhat different character than in ordinary antiferromagnetics. This difference is attributed to the fact that in magnetically ordered ferromagnetics perturbations in the spin system are related to the electromagnetic field not only through the Maxwell equations but also directly due to the presence of mixed magnetielectric and electromagnetic susceptibilities in these crystals along with electric and magnetic susceptibilities. The spectrum of coupled oscillations both

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USSR   UDC: 534.143:538.115:537.226.33

AKHIYEZER, I. A. and DAVYDOV, L. N.

"Possibility of Parametric Excitation of Spin Waves in Magnetical-
ly Ordered Ferroelectrics"

Abstract: The purpose of this paper is to show   that in anti-
ferromagnetic and weakly ferromagnetic crystals   parametric excita-
tion of spin waves by an external, varied electric field is possible.
Starting their analysis with the expression for the full macroscopic
energy of a magnetically ordered ferroelectric, with no external
constant electric or magnetic fields, the authors omit the term
corresponding to weak ferromagnetism as leading to a trivial re-
sult. They then obtain expressions for the frequency and rate of
increase   of both the activation and activationless parts of the
spin waves. Expressions are also obtained for the frequencies and
increments of the spin oscillations for anisotropic antiferromag-
netics. For the spin oscillations to occur, the increment must ex-
ceed the attenuation decrement caused by interaction of the spin
waves with phonons and heterogeneities in the crystal. The authors
express their gratitude to A. I. Akhiyezer for his comments.

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USSR

AKHIYEZER, I. A.; DAVYDOV, L. N. (Physics and Engineering Institute, Ukrainian Academy of Sciences, Khar'kov)

"A Theory for Electromagnetic Fluctuations in Magnetically Ordered Crystals"

ABSTRACT: Fluctuations of quantities characterizing ferromagnetics and anti-ferromagnetics were studied, taking into account the relation between spin waves and electromagnetic waves. This consideration was necessary in the case of relatively long-wave fluctuations (wave lengths of a millimeter or more). Fluctuations in antiferromagnetics with magnetic anisotropies of the easy axis and easy plane types in the nonresonance area as well as in the neighborhood of electromagnetic spin resonance were investigated. The expressions found for the correlators differ substantially from those obtained earlier by the author and others and lead to the latter only in the short-wave region. In addition to fluctuations in antiferromagnetics the authors also made a study of long-wave fluctuations in ferromagnetics.

The article includes 27 equations and 3 figures. There are 6 references.

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USSR

AKHIYEZER, I. A.; BARTS, B. I. (Physics-Engineering Institute of the Ukrainian Academy of Sciences, Khar'kov)

"Oscillations of a Fermi Fluid in a Gravitational Field"

ABSTRACT: The properties of a system of Fermi particles (Fermi fluid) are studied in a gravitational field. Apparently the substance of neutron stars may be considered as such a system. The equilibrium distribution of a Fermi fluid in a gravitational field (the barometric formula for a Fermi fluid) is found. The hydrodynamic equations describing low-frequency motions of such a system are derived.

    Collective oscillations of a Fermi fluid in a gravitational field are investigated. It is shown that two zero sound modes and two ordinary sound modes may propagate in it. so that under certain conditions sound waves can appear. If such an occurence takes place in a neutron star, it must lead to turbulent phenomena in the external strata of the star.
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USSR

AKHIYEZER, I. A.; SYSHCHENKO, V. G. (Khar'kov State University)

"Surface Fluctuations and Scattering of Slow Neutrons in Antiferromagnetics"

Leningrad, Fizika Tverdogo Tela; February, 1971; pp 573-8

ABSTRACT: The surface fluctuations and scattering of slow neutrons in anti-ferromagnetics with perturbation (or absorption) of surface spin waves were studied. Expressions were obtained for correlation functions containing terms damping out in the depth of the crystal and, therefore, describing surface fluctuations. These terms have sharp maxima corresponding to the possibility of propagation in the antiferromagnetic of surface spin waves of two types -- optical and acoustical. Because of this, additional sharp maxima corresponding to the scattering of neutrons with a perturbation of surface oscillations occur in the scattering cross section of the slow neutrons.

The article includes 20 equations. There are 5 bibliographic references.

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USSR

AKHIYEZER, I. A., and DAVYDOV, L. N., Engineering Physics Institute, Academy of Sciences Ukrainian SSR, Khar'kov

"Behavior of Magnetically Ordered Ferroelectrics in a Rapidly Oscillating Electrical Field"

Abstract: The effect of a rapidly oscillating electrical field on a ferro-electric antiferromagnetic in a constant magnetic field H_o was studied. The field frequency was much greater than the frequency of the natural vibrations of the spin system of the crystal. At the critical point of external magnetic field, temperature, and pressure -- where there is a phase transition in the magnetic system of the crystal -- spin waves are excited by a relatively small alternating electrical field. As an example, the case $H_o \sim H_c$ is then analyzed: H_c is the field at which the magnetic moments of sublattices are reversed. It is shown that the electrical field required to excite spin waves is proportional to $1 - (H_o/H_c)$.

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frequency omega higher than 10^{14} or 10^{15}), where the scattering cross section is coupled with the fluctuation correlation factor. The scattering cross section also increases sharply because of mutual coupling between e.m. waves and fluctuations, particularly with scattering at small angles.

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USSR

and elastic phenomena. Critical opalescence sharply increases.

It was found that with the propagation of magneto-elastic waves along the anisotropy axis, one transverse sound wave and two modes of the spin wave, both degenerate, are generated. Damping decrements of coupled magneto-elastic waves were determined. Similar phenomena were observed in the transverse propagation of the waves, only this time phase velocity was considerably smaller than the transverse sound velocity, particularly near the critical point. Coupled waves propagating at an angle to the anisotropy axis, further away from the critical point, showed five components: two modes of spin waves, one of the longitudinal sound wave and two degenerate transverse sound waves.

Correlation factors for fluctuation and scattering were computed in the vicinity of the critical point where spin structure is unstable. These showed sharp increases (maxima) near frequencies where the wave vector satisfied scattering equations of the system.

The presence of critical fluctuations in antiferromagnetic materials leads to a sharp increase (near the critical point) of the scattering cross section for light. This is particularly noticeable at high frequencies (radial

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USSR

UDC 537.226+537.311:33):538

BELOZOROV, D. P. and AKHIYEZER, I. A., Institute of Radiophysics and Electronics of the Ukrainian Academy of Sciences, Kharkov State University imeni A. M. Gorkiy

"Magneto-Elastic Oscillations and Fluctuations in Antiferromagnetic Materials Near Points of Thermal Transition"

Abstract: When the temperature of a crystal reaches a critical value, its spin system becomes unstable. Spin waves, instead of being attenuated, increase in intensity. Instability of the spin system leads to the appearance of anomalous intensification of fluctuations of magnetic and elastic phenomena, which causes an increase of scattering cross sections for slow neutrons and e m. waves.
     The spectrum of the antiferromagnetic crystal and of the fluctuation of magnetic and elastic phenomena was investigated in the vicinity of critical temperature. It is shown that at that point an important role is played by the coupling between elastic waves and oscillations of magnetic moments of the sublattices. Thus, at the point, phase velocity becomes smaller than sound velocity, which condition is due to the long-wave fluctuation of the magnetic

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USSR

AKHIYEZER, I. A. and ANGELEYKO, V. V., Pis'mav Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 14, No 7,5 Oct 71, pp 434-436

With an increase in the level of turbulent fluctuations, the phase velocity reaches a value at which Cerenkov type excitations are no longer possible, further increase ceases, and the plasma passes into a stationary state with oscillations at a considerably lower level. This situation could take place, for example, in hydrogen plasma with a particle density of 10^{14} cm^{-3}, particle temperature for electrons of about 10^6 degrees, and ions -- 10^4 degrees, placed in a magnetic field B_0 of about 5×10^5 gauss, with a potassium ion beam passing through it having a beam particle density of 10^{11} to 10^{12} cm^{-3} and a beam velocity of about 10^7 cm/sec.

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USSR

AKHIYEZER, I. A., and ANGELEYKO, V. V., Kharkov State University imeni A. M. Gorkiy

"Nonlinear Variation of Phase Velocity and Stabilization of Plasma Oscillations"

Abstract: Conventional investigations of plasma turbulences are based on the assumption that the source of energy is provided by Čerenkov type excitations, and the sink of energy is represented by inelastic collisions (Landau damping).

The present paper suggests yet another possible mechanism: change in phase velocity due to nonlinear effects, leading to a high level of turbulent oscillations -- the state of stationary turbulence.

As an example, ionic-acoustic oscillations in a strongly magnetized plasma with hot electrons and a low-density ion beam along the magnetic field are examined. Starting with the dispersion equation for low-frequency oscillations, the plasma dielectric constant (electric susceptibility) is computed, leading to the determination of the magnitude of phase velocity.
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Magnetohydrodynamics

USSR

AKHIYEZER, I. A.; CHUDNOVSKIY, Ye. M. (Physicotechnical Institute of the Ukrainian Academy of Sciences, Khar'kov)

"Fluctuations in an Unstable Relativistic Plasma"

ABSTRACT: Fluctuations in an unstable relativistic plasma are studied.   General expressions for the correlation functions are obtained, and the case of an isotropic distribution of particles by velocity is studied in detail.   The fluctuations in a relativistic plasma with directed particle movement are considered.   It is shown that if the plasma consists of hot electrons moving relative to cold ions, then as the directed velocity of the electrons approaches the critical value determined, the level of fluctuations rises sharply (the phenomenon of critical fluctuations).

The article includes 18 equations.   There are 6 bibliographic references.

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USSR

UDC: none

AKHIYEZER, I. A. and BARTS, B. I.

"Theory of (Y,N) Reactions at Energies Above the Pion Generation Threshold"

Abstract: With the recent construction of electron accelerators at energies amounting to several Gev, a number of experimental research projects in photonuclear reactions, with the release of nucleons in the higher energy regions, have been performed. This paper represents a theoretical study of such reactions in the energy area of photons exceeding the levels at which the Levinger theory is justified. This theory explains the experimental data from the angular and energy dependence of released protons and from the dependence of cross sections on the mass number. Modifying the Levinger theory, the authors begin their analysis by citing the cross section of the reaction as $Y + A \rightarrow A' + N + \pi$, representing the photonuclear reaction, accompanied by the release of nucleons, likely to occur at energy levels of several hundreds of Mev. It is this reaction, as opposed to the Levinger equation of $Y + A \rightarrow A' + p + n$, which is basically the subject of investigation in the present paper.

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USSR

AKHIYEZER, I. A.; CHUDNOVSKIY, Ye. M. (Khar'kov State University)

"Resonance between Spin and Magnetohydrodynamic Waves in Antiferromagnetic Semiconductors and Metals"

Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Nov. 19__, pp ___

Abstract: Coupled oscillations of charge carriers and magnetic moments of atoms in antiferromagnetic semiconductors and metals are investigated in the case of an isotropic dispersion law for the charge carriers and for an arbitrary Fermi surface. It is shown that in such bodies resonance between the carrier and spin wave oscillations (MHD-spin resonance) occurs at a certain value of the external magnetic field strength. This resonance essentially differs from the ordinary electromagnetic-spin resonance: viz., resonance coupling of oscillations occurs in a broad frequency range (and not only at a single resonance frequency). Fluctuation correlators of quantities characterizing the crystal are determined and also the cross sections for scattering of phonons, electrons, and electromagnetic waves with excitation (or absorption) of these waves. It is shown that splitting of the scattering cross section takes place in the MHD-spin resonance point.

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USSR

AKHIYEZER, I. A.; BANTS, B. J.; LAZURIK-ELJTOUPIN, V. T. (Khar'kov State University)

"Oscillations of a Prop of Fermi Liquid and Giant Resonance in Medium and Heavy Nuclei"

Moscow, Yadernaya Fizika; May, 1972; pp 863-8

ABSTRACT: Giant resonance in nuclear reactions with medium and heavy nuclei was considered in the model of a drop of Fermi liquid. Both purely nuclear and electrical interactions between nucleons were taken into account. Within this model it is possible to describe the experimentally observed position of giant dipole resonance in photonuclear reactions with a large number of nuclei: in particular, to explain a slower decrease of the resonant energy with increasing A than according to the usual law for liquids A^{-1}. The corrections involved were taken from an analysis of data not related to giant resonance. A number of experimental points do not fall on the curve corresponding to the excitation of dipole oscillations but fall near the calculated curves corresponding to $l = 0$ and $l = 2$. Consequently, the experimental data on the of the multipolarity of the corresponding levels should be of great interest.

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USSR

AKHIYEZER, I. A.; GINZBURG, A. E. (Physicotechnical Institute of the Ukrainian Academy of Sciences, Khar'kov)

"Fluctuations and Scattering of Slow Neutrons and Electromagnetic Waves near the Critical Antiferromagnetic-Ferromagnetic Transition Point"

Abstract: The fluctuations and scattering of slow neutrons and electromagnetic waves in antiferromagnetic crystals near the critical antiferromagnetic-ferromagnetic transition point were studied. Correlators of the fluctuations characterizing such crystals were determined, and it was shown that as the critical point is approached, the correlators increase sharply, which phenomenon is related to an instability of the spin system of the crystal arising at that point. As a consequence of this, the differential scattering cross section of the slow neutrons and electromagnetic waves increases sharply as the critical point is approached.

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USSR

AKHIYEZER, I. A., et al, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, vol. 61, No. 4(10), October 1971, p. 1711-1715

sublattice ferromagnetics far from the critical temperature are investigated, and it is shown that additional maxima, absent in ordinary ferromagnetics, arise in the cross sections of slow neutron and light scattering. The authors are connected with the Physico-Technical Institute of the Ukrainian Academy of Sciences.

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USSR

AKHIEZER, I. A. and ST____, I. A.

"Spin Waves and Scattering of Slow Neutrons and Light Near the
Critical Point of Transition from the Ferromagnetic to the Anti-
ferromagnetic Phases"

Abstract: This paper deals with those magnetically ordered crys-
tals which are ferromagnetic above a particular temperature level
and antiferromagnetic below it, an example of which is the crystal
of FeRh for which this critical temperature is 350° K. The pe-
culiarities of the high-frequency characteristics of such crystals
are investigated as they approach the critical temperature from
the side of the ferromagnetic phase. It is shown that at tempera-
tures close to critical the spin wave spectrum of these crystals
differs markedly from those of ordinary ferromagnetic and antifer-
romagnetic ones. Fluctuations in the magnetic moment are ex-
amined and it is found that the level of their fluctuations rises
sharply as the critical temperature is approached. This phenomenon
of the critical fluctuations is the result of the crystal spin sys-
tem instability. Fluctuations in the magnetic moment lead to

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USSR   UDC: None

AKHIYEZER, I. A. and CHUDKOVSKIY, Ye. K.

"Fluctuation and Dispersion of Slow Neutrons in Collective
Excitations of an Electronic Fermi Fluid in Metals"

Leningrad, Fizika Tverdogo Tela, vol 14, No 7, 1972, pp 2041-2047

Abstract: The connection between spin density oscillations of slow
neutrons and cyclotron waves and the neutron dispersion processes
in spin waves in nonmagnetic metals is investigated in this paper.
An analysis is made of the related   cyclotron spin waves and
cyclotron spin resonance in the short-wave region. It begins with
an expression for the energy of the quasi-particle or conductivity
electron energy as a function of the particle distribution. This
expression embodies the Fermi fluid interaction between particles,
which is responsible for the possibility of the existence of spin
waves in ordinary metals. General expressions are obtained for
the correlation functions and the cross sections of the dispersion,
and the fluctuations and scattering of neutrons far from the cyclo-
tron-spin resonance point. Also discussed is cyclotron-spin reso-
nance resulting from the coincidence of the unperturbed cyclotro
and spin wave frequencies. Equations for both these frequencies
are derived. The authors are associated with the A. M. Gor'kiy
State University at Kharkov.

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USSR

AKHIYEZER, I. A. et al (Physicotechnical Institute, Ukrainian Academy of Sciences)

"Temperature Magnetoacoustical Resonance in Crystals with an Antiferro-Ferromagnetic Transition"

ABSTRACT: Coupled magnetoacoustical oscillations are investigated in crystals in which a temperature transition between ferro- and antiferromagnetic phases is possible. It is shown that for a given temperature in the anti-ferromagnetic phase of such crystals a resonance between sound and a low-activation spin wave occurs in a broad frequency range. It is pointed out that such crystals may be employed for exciting ultrasound by means of varying magnetic fields.

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USSR

AKHIYEZER, I. A.; GINSBURG, A. E. (Khar'kov State University)

"Spin Waves and Scattering Processes of Slow Neutrons and Light in Antiferromagnetics with a Small Exchange Constant"

Kiev, Ukrainskiy Fizicheskiy Zhurnal; August, 1972; pp 1339-45

ABSTRACT: The authors studied high-frequency properties of an antiferromagnetic phase in magnetically ordered crystals in which a transition from an antiferromagnetic to ferromagnetic state is possible. A crystal with an "easy plane"-type anisotropy was considered. Spectra of spin waves and correlation functions of the values characterizing such a crystal were determined. Near the critical point of the transition from the antiferromagnetic to the ferromagnetic phase the correlation functions were shown to increase sharply (phenomenon of critical fluctuations). Scattering processes of slow neutrons and light were studied, and differential cross sections of these processes near the critical point were shown to be anomalously large.
The article includes 23 equations. There are three references.

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USSR   UDC 538.69:539

AKHIYEZER, I. A., and GINZBURG, A. E., Khar'kov State University imeni A. M. Gor'kiy

"Slow Electromagnetic Waves in Antiferromagnets Near the Transition Point to the Ferromagnetic Phase"

Abstract: The article considers connected electromagnetic-spin waves in antiferromagnets in which a phase transition to the ferromagnetic state is possible. It is assumed that the crystal has magnetic anisotropy of the easy plane type.

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USSR

AKHIYEZER, I. A.; CHUDNOVSKIY, Ye. M. (Khar'kov State University)

"A Theory of Fluctuations and Particle Scattering in Ferromagnetic Semiconductors and Metals"

Kiev, Ukrainskiy Fizicheskiy Zhurnal; November, 1972; pp 1770-6

ABSTRACT: The fluctuations and scattering of electrons and slow neutrons in ferromagnetic semiconductors and metals by guided magnetohydrodynamic-spin waves are studied. Crystals in strong as well as weak external magnetic fields in the case of the general (not necessarily isotropic) law of dispersion of the charge carriers are examined. It is shown that in the case of a strong magnetic field the maxima in the scattering cross sections of the particles are split. In the case of a not overly strong magnetic field three (or four) new types of sharp maxima occur in the particle scattering spectrum, from the position of which it is possible to determine the law for the dispersion of guided waves.

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USSR

AKHIYEZER, I. A.; CHUDNOVSKIY, Ye. M. (Khar'kov State University)

"Guided Waves and Particle Scattering in Ferromagnetic Semiconductors and Metals"

Kiev, Ukrainskiy Fizicheskiy Zhurnal; November, 1972; pp 1761-8

ABSTRACT: The scattering of electrons and slow neutrons in ferromagnetic semiconductors and metals by guided cyclotron- and plasma-spin waves is studied. Expressions for the correlation functions of fluctuations of the quantities characterizing ferromagnetics are obtained. The scattering cross sections of electrons and neutrons by guided waves far from electromagnetic spin resonance and in its vicinity are found. It is shown that as one approaches the point of electromagnetic spin resonance in the differential scattering cross section of the particles, instead of one maximum caused by the scattering by one of the branches of oscillations, two maxima very close together occur. It is shown that in cases of cyclotron-spin resonance in metals a strong connection between a spin wave and a branch of the electromagnetic oscillations, which are a continuation of the cyclotron wave in the neighborhood of the longer waves, is possible.

1/1

USSR

AKHIYEZER, I. A., LAZURIK-EL'TSUFIN, V. T., Khar'kov State University imeni
A. M. Gor'kiy

"Dynamic Effect During Transmission of Charged Particle Beams in Solids"

Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 63, No 5(11),
Nov 72, pp 1776-1779

Abstract: The authors determine dynamic loads in a solid when beams of
charged particles pass through it. It is shown that in the moderately high-
energy region loads increase linearly with an increase in beam energy. At
high energies (up to a few hundred MeV) the loads in the case of electron
(positron) beams are independent of energy, while in the case of a proton
beam they decrease with increasing energy. A method is proposed for experi-
mentally verifying the theory by measuring the amplitude of the sound in-
duced by the beam. The authors thank A. I. Akhiyezer and V. D. Volovik for
constructive criticism.

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Electricity and Magnetism

USSR

AKHIYEZER, I. A.; SPOL'NIK, Z. A. (Physicotechnical Institute of the Ukrainian Academy of Sciences, Khar'kov)

"A Theory of Magnetic Transitions in Antiferromagnetics"

ABSTRACT: The authors studied the thermal antiferromagnetic-ferromagnetic transition in magnetically ordered crystals. It is shown that in the presence of weak ferromagnetism this transition takes place, not with a jump, but smoothly, so that in a temperature interval on the order of $0.1°$ the crystal is in an intermediate state between the ferro- and antiferromagnetic. It is estab-lished that thermal hysteresis during such a transition is possible. In addi-tion, the effect of spontaneous electrical polarization and an external electri-cal field on the reversal of the magnetic moments of the sublattices in anti-ferroelectrics is studied.

The article includes 10 equations. There are 10 bibliographic references.

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USSR

Sections 4 and 5 examine these two cases in detail.

The calculations in this article assume the absence of strong fields. The authors have also done studies of the effect of a strong magnetic field. These indicate that the effect of sufficiently powerful fields is to reduce or inhibit the exchange of energy between the longitudinal and transverse degrees of freedom.

2/2

USSR

AKhIYeZER, I. A., and ANGELEYKO, V. V., Khar'kov State University imeni A. M. Gor'kiy

"On the Relaxation of Longitudinal and Transverse Temperature in a Plasma with Directed Electron Movement"

Abstract: Even where the directed movement of electrons in a plasma is relatively small, it has a significant effect on the relaxation temperature conditions. In a plasma whose electrons are "at rest", the transverse and longitudinal temperatures tend to become equalized in the equilibrium state, but in a plasma in which the electrons have overall motion, these two temperatures differ in the equilibrium state, with the longitudinal electron temperature being greater by approximately the energy of directed motion. The relaxation time to reach this equilibrium state is sufficiently brief that the overall electron temperature can be considered constant during the interval.

In section 2 of the article, the Fokker-Planck coefficients of diffusion and friction are determined for a plasma in which the electrons move relative to the ions. In section 3 it is shown that the temperature relaxation within the electron component is primarily influenced by near interactions if the ion temperature is within an order of magnitude of the electron temperature, but that distance interactions (the exchange of ion-sound oscillations) predominate when the electron temperature is three or four orders of magnitude greater.

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USSR

AKHIYEZER, A. I. and BEREZHNOY, Yu. A.

"Optical Potential Theory of Complex Particles"

Abstract: The elastic scattering of nucleons and more complex par-
ticles by nuclei can be described by an optical model. The purpose
of this paper is to construct the optical potentials of such com-
plex particles as deuterons, tritons, He^3 nuclei, and alpha parti-
cles, on the basis of the Sitenko-Glauber diffraction theory, and
to investigate "eclipsing" and nucleon-nucleon correlation effects
in the nuclei on the magnitude of the optical potential. The ana-
lysis begins with a complex vector expression for the amplitude of
the elastic scattering of a complex particle by a nucleus in the
diffraction model. An expression is obtained for the mean-square
radii of the optical potentials, a quantity which is a function of
the dimensions of the particle incident on the nucleus. The au-
thors express their thanks to A. P. Soznik for the numerical com-
putations.

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USSR

AKHIYEZER, A. I., and POLOVIN, R. V., Khar'kov State University

"A Theory of Thermodynamic Fluctuations in Nonlinear Systems"

Moscow, Teoreticheskaya i Matematicheskaya Fizika, Nov 73, pp 230-239

Abstract: The authors develop a method for determining the correlation functions of thermodynamic fluctuations in nonlinear systems. It is proved that of all the nonlinear parameters characterizing a system, the correlation properties are influenced only by those which determine reversible processes in the system. With respect to dissipative processes, the correlation functions depend only on the dissipative coefficients of a linearized system. In particular, the correlation functions of fluctuations of current and voltage of a C, R circuit are determined by the nonlinear capacitance and do not depend on the nonlinear resistance.
        The article includes 27 equations and one figures. There are 16 references.

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- END -

CSO: 1862-W

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Electricity & Magnetism

USSR

AKHIYEZER, A. I., AKHIYEZER, I. A. (Khar'kov State University)

"On the Possibility of Spin Wave Excitation in Magnetic-Ordered Ferroelectric Substances"

Abstract: Excitation of spin waves in ferroelectric magnetic-ordered crystals is investigated. It is shown that such a crystal is also a semiconductor, excitation of spin waves by an external stationary electric field should be possible. The mechanism of such excitation is different in principle from well-known mechanism of excitation of spin waves by an electric field in ordinary (non-ferroelectric) magnetic-ordered semiconductors and should lead to considerably greater increments.

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USSR $\mathcal{A}$

AKHIYEZER, A. I., REKALO, M. P., Physicotechnical Institute of
the Academy of Sciences, Ukrainian SSR

"The Photoproduction of Neutral Vector Mesons by Light Nuclei"

Abstract: The coherent photoproduction of neutral vector mesons
by H^2, H^3, and He^3 nuclei on the basis of the Regge pole model
and the quark model is considered. The experimentally observed
ratio of cross sections of the photoproduction of /'-mesons by a
deuteron and a proton can be explained only in terms of a Regge
pole model. The models considered predict that the ratios of
cross sections of the photoproduction of ω-mesons by H^2, H^3,
and He^3 nuclei and cross sections of the photoproduction of an
ω-meson by a proton should be substantially less than the values
obtained under the assumption of purely diffractional production
of ω-mesons.

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USSR

the plasmons is sufficiently great, one can increase the energy of the plasmons
by a simple method, modulating the external parameters on which their frequen-
cies depend. In the case of a collisionless magnetoactive plasma with hot
electrons and cold ions, it is possible for three types of low-frequency,
weakly damping collective oscillations to exist: Alfven, fast, and slow mag-
netosonic waves. The frequencies of these waves depend on the external mag-
netic field, and by modulating this field one can heat the gas of Alfven and
magnetosonic waves. The energy transmitted to the plasmons in this method
of heating, which can be called the magnetic pumping method, can considerably
exceed the Joule heat directly obtained by the particles in magnetic pumping
Gradually the energy lost by the plasmons will transfer to the particles, and
in the plasmon subsystem itself there will be established a certain stationary
energy level (the level of turbulent noises). Plasma electrons will then
basically be heated in a nonisothermal plasma due to the effect of Landau
damping. Conditions are derived under which the proposed method of magnetic
pumping can be achieved.

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USSR

AKHIYEZER, A. I., ALEKSIN, V. F., and KHODUSOV, V. D., Khar'kov State University

"Concerning a New Method for the Magnetic Pumping of Energy into a Turbulent Plasma"

Abstract: The new method of heating a plasma by magnetic pumping is introduced as follows: if the intensity of plasma waves ("plasmons") is sufficiently great, the interaction of the plasmons with one another may become more probable than interaction of plasmons with particles of the plasma. Under these conditions, the plasma may be considered as consisting of two weakly interacting subsystems, particles and plasmons, between which there occurs a slow exchange of energy. Relaxation in the plasma will have a two-stage character: there will first be set up quasistatic equilibria in the subsystems of particles and plasmons with different temperatures and there then will occur a slower process of temperature equalization. Particular attention is drawn here to the situation in which, if the initial energy of

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USSR

AKHIYEZER, A. I., FOMIN, P. I., and SHUL'GA, N. F., Kharkov State Institute imeni A. M. Gorky'

"Coherent Bremsstrahlung of Electrons and Positrons of Ultrahigh Energy in Crystals"

Abstract: The authors find that the bremsstrahlung of electrons and positrons has a coherent character for small angles of slope θ of the primary beam to the axis of the crystal. The theory of the effect in the first Born approximation has been described previously. In this approximation the radiation from electrons and positrons is the same. Here the authors wish to show that at sufficiently small angles θ the coherent effect increases the relative contribution of the second and higher Born approximations, which, in turn, leads to a substantial difference in the radiation from electrons and positrons at small angles θ even in crystals of light elements, but they note that the incoherent part does not act in the same manner. They are able to prove their assumptions through use of a mathematical apparatus. The article contains 4 bibliographic entries.
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USSR

UDC: 533.9

AKHIYEZER, A. I., POLOVIN, R. V., Physicotechnical Institute, Academy of
Sciences of the Ukrainian SSR, Khar'kov

"Oscillation Profile of the Shock Wave in a Plasma"

Abstract: The question of the oscillation structure of a shock wave in
a plasma was first taken up by R. Z. Sagdeyev ("Problems of Plasma Theory",
a collection of works, No 4, Moscow, Atomizdat, 1964, p 20), who considered
only one mechanism of energy dissipation -- friction between the electron
and ion components of the plasma. In this paper the authors investigate
the way in which other mechanisms of dissipation (principally the internal
friction of each of the plasma components) affect the shock wave oscil-
lation structure. It is shown that if the internal friction in the plasma
components exceeds the friction between the components, there is an ap-
preciable change in the shock wave structure as considered here when com-
pared with the case considered by Sagdeyev. One figure, bibliography of
four titles.

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USSR

AKHIYEZER, A. I., Academician of the Academy of Sciences Ukrainian SSR, and
PELETMINSKIY, S. V., Khar'kov State University imeni A. M. Gor'kiy

"Kinetics of Black-Body Radiation"

Moscow, Doklady Akademii Nauk SSSR, Vol 200, No 6, 1971, pp 1317-1320

Abstract: It is well known that if an inner cavity is made in a body in a
state of statistical equilibrium, equilibrium radiation occurs in the cavity.
The article studies how the process of photon thermalization takes place in
such a cavity and the substance surrounding it. The authors first consider
the process whereby thermal equilibrium of the photons is established in the
substance itself in the absence of a cavity. Then it is assumed that there
is a cavity in the substance, bounded by two parallel planes.

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USSR   UDC:

AKHIYEZER, A. I., BAR'YAKHTAR, V. G., and KVIRIKADZE, A. G., Kharkov State University imeni A.M. Gor'kiy

"Parametric Excitation of Hypersound in Ferromagnetics"

Abstract: The authors calculate the increment of hypersound which is caused by the oscillations of a magnetic moment of large amplitude. It is shown that in a temperature range one order of magnitude less than the Debye temperatures the increment can exceed the sound damping constant. Original article: 11 formulas and seven bibliographic entries.

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USSR

AKHIYEZER, A. I.; REKALO, M. P. (Physicotechnical Institute of the Ukrainian Academy of Sciences, Khar'kov)

"Scattering of High-Energy γ Quanta by Nucleons and Nuclei in a Quark Model"

ABSTRACT: The amplitudes of elastic γN-scattering are related in a quark model to the amplitudes of elastic scattering of mesons by nucleons. These relationships make it possible to predict the dependence of the total cross sections of the γN-interaction on the energy and to calculate the magnitudes of the real parts of the elastic γN-scattering amplitude at a zero angle, as well as the magnitudes of the differential cross sections of γN-scattering. A quark mechanism which takes into account in the most general manner the effects of rescattering is proposed for the scattering processes of γ quanta by nuclei. The dependence of the total cross sections of the γ-quanta interaction with nuclei on the atomic number, which was observed during the experiment, does not agree with the predicted hadronlike behavior of γ quanta in nuclear material.

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USSR

AKHIYEZER, A. I., AKHIYEZER, I. A., BAR'YAKHTAR, V. G. (Physicotechnical
Institute of the Ukrainian Academy of Sciences)

"Electron-Electron Collisions and Electrical Conductivity of Metals at Low
Temperatures"

Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, July 1973, pp
342-345

Abstract: The contribution of electron-electron collisions to the resistance
of pure metals at low temperatures is determined. It is shown that due to
compensation of coulomb repulsion of electrons and their attraction due to
virtual phonon exchange, the effective interaction between the electrons is
appreciably decreased. Consequently, the contribution of electron-electron
collisions to the resistance of a number of metals is proportional to T^6
in a broad temperature range (and not to T^2 as predicted by the Landau-
Pomeranchouk theory; T is the metal temperature).

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USSR

AKHIYEZER, I. A. et al, <u>Fizika Tverdogo Tela</u>, Vol 14, No 2, 1972,
pp 467-470

the differential cross section of slow neutron dispersion. It is
shown that two closely situated maxima, rather than a single one,
appear in spiral wave dispersion near the resonance point, a phe-
nomenon which can occur only for weak attenuation of the coupled
waves. The author is connected with the A. M. Gor'kiy State
University of Kharkov.

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USSR

AKHIYEZER, I. A. and CHUDNOVSKIY, Ye. M.

"Dispersion of Electrons and Neutrons in Coupled Spiral-Spin Waves"

Abstract: The phenomenon studied in this paper is the propagation in condensing bodies of oscillations as the result of the passage of electrons and slow neutrons through those bodies. Since the intensity of the particle dispersion is determined by the level of the oscillations which may take electromagnetic, spin, and sonic forms the particular subject of the paper is the fluctuations characterizing ferromagnetic semiconductors and metals, with the coupling between electromagnetic and spin oscillations taken into account. Expressions are obtained for the dispersion of the coupled waves in a ferromagnetic conductor in a constant magnetic field parallel to the anisotropic axis of the conductor and for

1/2

USSR

2/2

`USSR`

AKHIEZER, I. A., BARTS, B. I., LAZURIK-EL'TSUFIN, V. T. (Kharkov
State University imeni A. M. Gorkiy)

"Giant Resonance in a Model of a Fermi-Liquid Drop"

Abstract: Giant resonance in nuclear reactions is related to the
collective (or bulk) vibrations of the surface and nuclear parti-
cles. An attempt is made to understand giant resonance in real
nuclei by considering the finite dimensions of the nucleus in a
Fermi-liquid drop and by comparing theoretical and experimental
data on dipole resonance in photonuclear reactions. The drop is
viewed as a sphere, and both nuclear and electrical forces acting
between the nucleons are considered.

The model of a Fermi-liquid drop with a free boundary is shown to
be a good description of giant dipole resonance for a large number
of nuclei.

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USSR

AKHIYEZER, I. A. and KALINICHENKO, A. I.

"Interaction of Ferromagnetics in the Metastable State With a
Neutron Beam"

Leningrad, Fizika Tverdogo Tela, vol 15, No 3, 1973, pp 942-943

Abstract: This theoretical brief communication shows that at the
boundary of the metastable region the increment in spin waves of
a neutron beam passing through a ferromagnetic material tends to
infinity. Hence, the increment in spin waves and the upsetting of
the magnetic moment in the ferromagnetic material will result from
beams of even low densities. It is because of this fact that the
interaction of such beams and ferromagnetics in a metastable state
is of especial interest. The theory of amplification of the waves
is generalized for the case of ferromagnetics in this state. The
authors also evaluate the minimum beam density causing the upset-
ting of the ferromagnetic material's magnetic moment. They express
their gratitude to V. D. Volovik and V. T. Lazurik-El'tsufin for
their useful comments.
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USSR

AKHIYEZER, A. I., AKHIYEZER, I. A., BAR'YAKHTAR, V. G. (Physicotechnical
Institute of the Ukrainian Academy of Sciences)

"Electron-Electron Collisions and Electrical Conductivity of Metals at Low
Temperatures"

Abstract: The contribution of electron-electron collisions to the resistance
of pure metals at low temperatures is determined. It is shown that due to
compensation of coulomb repulsion of electrons and their attraction due to
virtual phonon exchange, the effective interaction between the electrons is
appreciably decreased. Consequently, the contribution of electron-electron
collisions to the resistance of a number of metals is proportional to T^6
in a broad temperature range (and not to T^2 as predicted by the Landau-
Pomeranchouk theory; T is the metal temperature).

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LANKINA, T. A., PANFILOVA, Z. F., AMINOV, S. N., AND AKHEMEDOV, K. S.,
Institute of Chemistry, Academy of Sciences uzbek SSSR

"Synthesis and Surface-Activity Characteristics of Glycol Esters of Alkyl-
phosphonic Acids"

Abstract: By the interaction of dichlorides of alkylphosphonic acids with
glycol in the presence of triethylamine in ether solutions at a temperature
$\leq 5°$, esters $RP(O) \underset{\text{OCH}_2\text{CH}_2}{\overset{\text{OCH}_2\text{CH}_2}{\diagdown}} O$ were synthesized, where $R = C_n H_{2n+1}$ and

$n = 6 - 14$. Cyclization of the diglycol esters which formed initially took
place during their distillation in vacuo. The esters with $n = 8 - 14$ showed
a high effectiveness as surface-active agents reducing the surface tension.

Pathology

UDC 616.993.12:616.935-07

USSR

AKHAMOV
AHAMOV, YU. A., and SADOVSKAYA, T. M., Chair of Infectious Diseases, Dagestan
Medical Institute

"Present-Day Clinical Course of Amebiasis Combined With Bacillary Dysentery"

Abstract: Of 547 amebiasis patients observed, the disease was combined with
bacillary dysentery in 116 (20.9%). The diagnosis was based on clinical
symptoms confirmed by laboratory tests. Various forms of Entameba histolytica
were isolated from 9.14% of the patients and dysentery bacteria from 81.7%.
The course of the mixed infection was mild in 60.5%, moderately severe in
24.9%, and severe in 14.6%; 5.1% died of complications and exhaustion. The
average hospital stay was 29.4 bed days. All received comprehensive therapy,
including emetine, contact amebicides, vitamins, and enemas containing grami-
cidin or antiseptics and most reserved. Major complications, the most
serious being intestinal perforation (4.3%), occurred when dysentery
developed after amebiasis was far advanced. The use of contact amebicides
and bacteriostatic agents cannot by themselves prevent complications. Hence
these patients should be followed up systematically and given several courses
of   emetine therapy.

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CIRC ACCESSION NO--AP0120355

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE ENTHALPY OF FORMATION OF SOLII
  BEH SUB2 AT 298DEGREESK (DELTA H SUBF298DEGREES) CALCD. FROM DATA ON THI
  HEATS OF DISSOLN. OF METALLIC BE AND BEH SUB2 IN 5PERCENT HCL, IS
  NEGATIVE 4.60 PLUS OR MINUS 0.17 KCAL-MOLE.

TITLE--ENTHALPY OF BEH SUB2 FORMATION -U-

AUTHOR-(03)-AKHACHINSKIY, V.V., KOPYTIN, L.M., SENIN, M.D.

COUNTRY OF INFO--USSR

SOURCE--AT. ENERG. 1970, 28 (3), 245-7

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY, PHYSICS

TOPIC TAGS--BERYLLIUM COMPOUND, HYDRRIDE, ENTHALPY

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1997/1576   STEP NO--UR/0089/70/028/003/0245/0247

CIRC ACCESSION NO--AP0120355

                         UNCLASSIFIED

USSR

AKHACHINSKIY, V. V., and BASHLYKOV, S. N., Atomnaya energiya, Vol 29, No 6,
Dec 70, pp 439-447

plutonium carbides, it is stated that the results of vapor pressure measure-
ments are preferred to data obtained by the emf method because of good agree-
ment with the results of various researchers and compatibility with thermic
data. A good deal of information is given in the form of tables and curves.

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UDC 621.039.542.3:541.11

USSR

AKHACHINSKIY, V. V., and BASHLYKOV, S. N.

"Thermodynamics of Uranium-Carbon, Uranium-Nitrogen, and Plutonium-Carbon Systems"

Moscow, Atomnaya energiya, Vol 29, No 6, Dec 70, pp 439-447

Abstract: This paper is a survey of various works on the thermodynamics of UC, U_2C_3, and UC_2, and other uranium carbides, discussing their thermal capacitances and content at high and low temperatures as well as their formation enthalpy and free energy. The same is done for UN and such plutonium carbides as $PuC_{0.95}$ and Pu_2C_3. With regard to the first class of compounds, the authors complain that the measurements conducted by researchers on the free formation energy are often for limited intervals of temperature and show marked divergences which make comparison difficult. They suggest that one cause of this divergence in results in the measurement of vapor pressure may be oxygen contamination, especially when the material measured is in powder form. Two methods of measuring the heat of formation of UN are given, the preferred one through the heat developed in the reaction U + $1/2N_2 \rightarrow$ UN. With regard to the measurement of free formation energy of the

1/2

UDC: 621.373:530.145.6

USSR

AKERMAN, D., YELISEYEV, P. G., KAYPER, A., MAN'KO, M. A., RAAB, Z.

"Methods of Mode Selection in Injection Semiconductor Masers"

V sb. Kvant. elektronika (Quantum Electronics--collection of works), No 1,
Moscow, 1971, pp 85-90 (from RZh-Radiotekhnika, No 5, May 71, Abstract No
5D173)

Translation: In order to improve the spectral composition of emission from
an injection semiconductor maser, especially to increase the output power
in one wave mode, external elements having spectral selectivity were intro-
duced into the maser cavity. The following modifications were experimentally
studied: a) a composite cavity; b) a cavity with an interference filter;
c) two optically coupled cavities of the Fabry-Perot type with different
lengths. The effect of the external selective element in the maser emission
spectrum is observed in all cases, and emission on a single longitudinal wave
mode is achieved at an appreciably higher excess over the threshold than in
conventional semiconductor injection masers. The output power in the single-
-frequency mode is as high as 0.5 W (in the case of a composite cavity).
An investigation is made of the possibilities for tuning the maser wavelength
by measn of external elements within the range of the amplification band of
the semiconductor. Five illustrations, bibliography of fifteen titles.

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UDC 621.375.82

USSR

AKERMAN, D., YELISEYEV, P. G., KAYPER, A., MAN'KO, M. A., RAAB, Z.

"Methods for Selection of Types of Oscillations in Injection Semiconductor Lasers"

V sb. Kvant. elektronika (Quantum Electronics -- Collection of Works), No. 1, Moscow, 1971, pp 85-90 (from RZh-Fizika, No 7, Jul 71, Abstract No 7D1115)

Translation: To improve the spectral composition of radiation of an injection semiconductor laser, particularly to raise the yield power in a mode of a single type of oscillations, external elements having spectral selectivity were introduced into the resonator of the semiconductor laser. The following versions were studied experimentally: (a) a compound resonator; (b) a resonator with an interference filter; (c) two optically connected Fabry-Perot-type resonators of different lengths.   The effect of the external selective element on the radiation spectrum of the laser was observed in all cases, and generation in one longitudinal type of oscillations was achieved for an essentially greater excess of the threshold than in ordinary injection semiconductor lasers. The output power in a single-frequency mode was up to 0.5 w (in the case of a composite resonator). Possibilities of detuning the wavelength of the laser with the aid of external elements was studied within the range of the amplification band of the semiconductor. 15 ref. Authors abstract.

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mechanics

AKELIS, M.E.

STUDY OF NOISE IN VIBRATION AT INDUSTRIAL ENTERPRISES OF THE LITHUANIAN SSR

M. E. Akelis and V. K. Vizgis (Vilnius)

AP0101488

gave 63% Et$_3$SnC:CPh, some Et$_3$SiOH, and PhC:CH. Similarly, Et$_3$SnOMe gave 84.7% Et$_3$SnC:CPh and MeOH. MeONa and (Et$_3$Sn)$_2$O in Et$_2$O overnight gave after treatment with Et$_3$SiCl, 33.9% Et$_3$SnOMe, b$_{12}$ 78°, 29.4% Et$_3$SiOSnEt$_3$, b$_2$ 100°, and some starting material; while MeONa and Et$_3$SiOSn-Et$_3$, followed by Me$_3$SiCl gave 29.3% Et$_3$SnOMe and 21% Me$_3$-SiOSiEt$_3$.

G. M. Kosolapoff

125

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Acc. Nr: Abstracting Service: Ref. Code:

AP0101488   CHEMICAL ABST. 6-7ɔ   4R0079

121641e **Interaction of distannoxanes, alkoxy- and siloxy-stannanes with sodium, sodium acetylides, and sodium methylate.** Komarov, N. V.; Sklyanova, A. M.; Akchurina, I. S. (Irkutsk. Inst. Org. Khim., Irkutsk, USSR). Zh. Obshch. Khim. 1970, 40(2), 336-9 (Russ). In reaction of Na, MeONa or Na acetylides with compds. contg. SnOSn, SnOSi and SnOC bonds, the Sn-O link is most reactive. Adding 2.3 g Na to 42.78 g $(Et_3Sn)_2O$ resulted in exothermic reaction which after 2 days standing, followed by addn. of 10.85 g Me_3SiCl and heating in Et_2O 7 hr gave 81.6% $Me_3SiOSnEt_3$, b_7 76-7°, d^{20} 1.1638, n_D^{20} 1.4559, 78.4% $(Et_3Sn)_2O$ and NaCl. Use of Et_3SiCl in the above gave 72% $Et_3SiOSnEt_3$ (I) b_2 90°, 1.1194, 1.4625. Similarly, Et_3SnOMe and Na, followed by Et_3SiCl gave 76% Et_3SiOMe and 81% $(Et_3Sn)_2O$. Treating I with Na, then with Me_3SiCl, gave 59% $Me_3SiOSiEt_3$ and 44.7% $(Et_3Sn)_2O$. Reaction of 49 g $(Et_3Sn)_2O$ with 0.11 mole $NaC:CH$ gave $Et_3SnC:CH$, b_{10} 58-9°, and 97% $Et_3SnC:CSnEt_3$, b_{10} 151-2°, —, 1.5095. Similar reaction with Et_3SnOMe gave 7.3% and 63% yields of these, resp. $PhC:CNa$ and $(Et_3Sn)_2O$ in Et_2O gave in 8 hr 55% $Et_3SnC:CPh$, b_1 102-4°, —, 1.5583, and 39% $Et_3SnC:CCH:CH_2$, b_3 79-80°, —, 1.5098. Similar reaction, but with $Et_3SiOSnEt_3$, in 12 hr

REEL/FRAME

19851395

7

Acc. Nr: AP0049053

Ref. Code: UR035

PRIMARY SOURCE: Vestnik Oftal'mologii, 1970, Nr /   ,
pp 90-91

AMAVROSIS RESULTING FROM SURGERY FOR SECONDARY STRABISMUS

G. Z. Akchuripa, T. A. Tsyganko

Summary

A case of blindness in one eye in a patient 54 years old supervening after surgery for secondary divergent strabismus is described. Prior to operation the visual acuity of this eye was 0.01 because of severe amblyopia with excentric fixation. Blindness came due to an acutely disordered circulation in the arterial system of the optic nerve. Vision was lost on the operating table when pulling Tenon's capsule during an attempt to find the muscle tenotomized in the past. The treatment was of no avail with complete atrophy of the optic nerve. In patients of advanced age a more reserved attitude with regard to such operations should be adopted.

REEL/FRAME
19800839

CIRC ACCESSION NO--AP0108938

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT.   THE DYNAMICS OF VIRUS NEUTRALIZING
   ANTIBODY WAS STUDIED IN SERATAKEN FROM 30 SUBJECTS RECEIVING A COMPLETE
   COURSE OF VACCINATIONS WITH COMMERICAL DRY ANTIRABIC VACCINE.   A HIGH
   ANTIGENIC ACTIVITY OF THIS PREPARATION WAS ESTABLISHED.

89

TITLE--ANTIGENIC ACTIVITY OF DRY SUCROSE ANTIRABIC VACCINE FROM SHEEP
   BRAIN -U-
AUTHOR-(04)-MOROGOVA, V.M., GILDINA, S.S., AKCHURINA, A.B., FILIMONOVA,
   YE.M.
COUNTRY OF INFO--USSR

SOURCE--VOPROSY VIRUSOLOGII, 1970, NR 2, PP 197-199

DATE PUBLISHED-------70

SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES

TOPIC TAGS--VIRAL VACCINE, RABIES, ANTIGEN, BRAIN

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1990/0732   STEP NO--UR/0402/70/000/002/0197/0199

CIRC ACCESSION NO--AP0108938
                        UNCLASSIFIED

USSR   UDC: 621.382.233(38)

AKCHURIN, E. A., RUD', V. V., SPIRIN, V. Ya.

"Tunnel Diodes in Communications Technology"

Tunnel'nyye diody v tekhnike svyazi (cf. English above), Moscow, "Svyaz'",
1971, 137 pp, ill. 50 k. (from RZh-Radiotekhnika, No 5, May 71, Abstract No
5A10 K)

Translation: The authors investigate fundamental tunnel-diode devices used
in communications technology (amplifiers, frequency converters, self-excited
oscillators, etc.). Particular attention is given to problems of the sta-
bility of the characteristics of these devices. The book is written for
engineers, graduate students and advanced undergraduate students majoring in
radio engineering. There are 149 illustrations, 6 tables, and a bibliography
of 44 titles. Annotation.

1/1

USSR

AKCHURIN, E. A. et al., TUNNEL'NYYE DIODY V TEKHNIKE SVYAZI, Moscow, "Svyaz'", 1971

4/4

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USSR

AKCHURIN, E. A. et al., TUNNEL'NYYE DIODY V TEKHNIKE SVYAZI,
Moscow, "Svyaz'", 1971

3/4

USSR

AKCHURIN, E. A. et al., TUNNEL'NYYE DIODY V TEKHNIKE SVYAZI,
Moscow, "Svyaz'", 1971

2/4

Communications

USSR   356   UDC: 621.382.2

BOOK

AKCHURIN, Eduard Aleksandrovich, RUD', Viktor Vasil'yevich, SPIRIN, Vladimir Yakovlevich

TUNNEL'NYYE DIODY V TEKHNIKE SVYAZI (Tunnel Diodes in Communications Engineering), Moscow, "Svyaz'", 1971, 137 pp, illus, biblio, 13 850 copies printed

       The book investigates basic tunnel diode devices used in communications technology (amplifiers, frequency converters, self-excited oscillators, etc.), giving particular attention to questions of stability of the characteristics of the devices.

       Written for engineers as well as graduates and undergraduate upperclassmen in radio engineering.

1/4

USSR

AKBERGENOV, V. N.

"Synthesis of Combination Circuits Considering Limitations Placed on Logic
Elements Used"

Tekhn. Nauki. Vyp. 12 [The Technical Sciences, No 12 -- Collection of Works],
Alma-Ata, 1972, pp 141-145 (Translated from Referativnyy Zhurnal Kibernetika,
No 4, 1973, Abstract No 4V450, by the author).

Translation: A method is studied for synthesis of minimal combination cir-
cuits (in the dnf class), considering the parameters of the logic elements
used (signal delay, number of inputs, loading capacity, etc.), and also con-
sidering the operating speed of the circuit required, allowing the process
of synthesis of the circuit itself to be made considerably more rapid and
easier.

1/1

USSR   UDC 632.95

AKBAYEV, A., and YEZHOVA, V. V., Institute of Organic Chemistry Acad. Sci.
Kirghiz SSR

"The Method of Preparation of an Anhydrous Thiourea Complex of Tri-Substi-
tuted Copper Phosphate"

USSR Author's Certificate No 307062, filed 16/4/69, published 3/09/71.
(Translation from Referativnyy Zhurnal Khimiya, No 8, Moscow, 1972, No 8
N616)

Translation: $Cu_3PO_4 \cdot 6(NH_2)_2$ CS (I) was produced by mixing a saturated
solution of $(NH_2)_2$ CS with $Cu_3(PO_4)_2$. Five gm of $Cu_3(PO_4)_2$ was added to
a solution of 26 gm $(NH_2)_2$ CS in 100 ml water at a pH of 5.5 and tempera-
ture of 40°. It was stirred for 8 hours, the precipitate filtered off and
dried in air at 20°. (I) was obtained at a yield of 96.8%, mp 130°. It
can be used as a seed disinfectant and antihelminthic compound.

1/1

2/2   015   UNCLASSIFIED   PROCESSING DATE--30OCT70
CIRC ACCESSION NO--AP0111635
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. STRUCTURE ARISING FROM THE
   COUPLING OF 3 PRIME NEGATIVE STATES WITH PARTICLE HOLE STATES IS
   CALCULATED.   FACILITY: MOSCOW STATE UNIV., USSR.

UNCLASSIFIED

1/2   015   UNCLASSIFIED   PROCESSING DATE--30OCT70
TITLE--ONE MORE SOURCE OF THE ADDITIONAL STRUCTURE OF DIPOLE RESONANCES
   -U-
AUTHOR-(05)-ZHIVOPISTSEV, F.A., NAGAR, N.EL., SHITIKOVA, K.V., YUDIN,
   N.P., AKBARY, M.Y.
COUNTRY OF INFO--USSR

SOURCE--PHYS. LETTERS (NETHERLANDS), VOL. 31B, NO. 6, P. 347-9 (16 MARCH
   1970)
DATE PUBLISHED--16MAR70

SUBJECT AREAS--PHYSICS

TOPIC TAGS--DIPOLE INTERACTION, NUCLEAR ENERGY LEVEL, NUCLEAR RESONANCE,
   INELASTIC SCATTERING, PARTICLE INTERACTION, ELECTRON HOLE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1992/0442   STEP NO--NE/0000/70/031/006/0347/0349

CIRC ACCESSION NO--AP0111635
                              UNCLASSIFIED

USSR

ZIYAYEV, A. A., et al., USSR Author's Certificate No 343975, filed 13 Jul 70, published 14 Aug 72

also in synthesizing mono- and polyesters containing physiologically active fragments in the macromolecule.

2/2

USSR

UDC 632.95

ZIYAYEV, A. A., OTROSHCHENKO, O. S., SADYKOV, A. S., TOLKACHEVA, G. A.,
AKBAROV, KH. A., and KHODZHAYEVA, T. A.

"A Method of Making β-β'-Di-$[$piperidyl-2- (or 1-Methylpiperidyl-2$)$ $]$
Disodium- γ, γ'-Dihydrodipyridyl Carbamate"

USSR Author's Certificate No 343975, filed 13 Jul 70, published 14 Aug
72 (from RZh-Khimiya, No 10, May 73, Abstract No 10N614P by N. V. Lebedeva)

Translation: β, β'-Di-(piperidyl-2)-disodium-γ, γ'-dihydrodipyridyl
carbamate (I) and β, β'-di-(1-methylpiperidyl-2)-disodium- γ', γ'-
dihydrodipyridyl carbamate (II) are synthesized by reacting anabasine (III)
or N-methylanabasine (IV) respectively with dispersed metallic sodium in an
organic solvent in a molecular nitrogen atmosphere at 50-60°C. Example:
50 g of III or IV are added to a suspension of 10 g of Na in PhMe, the reaction
mass is agitated in a stream of N_2 at 50-60°C until the sodium dissolves,
and treated with CO_2. The resultant mass is evaporated, the residue is washed
with n-hexane and filtered giving compound I or II with a yield of 90%, the
melting point of I is above 400°C, molecular weight 458; the melting point of
II is above 400°C, molecular weight 486. The values of R_c are given for I
and II as well as IR-spectral data. I and II can be used as herbicides, and
1/2

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USSR

AKAYEV, A. and DUL'NEV, G. N.

"Improving the Accuracy of the L. V. Kantorovich Method as Applied
to Boundary Value Problems of Stationary Heat Conductivity"

Abstract: Of the methods available for solving boundary value
problems of thermal conductivity, that of Kantorovich is pre-
ferable for two-dimensional and three-dimensional problems.
Earlier attempts to use the Kantorovich method in this applica-
tion suffered from defects which the method proposed in this
brief communication avoids. It is quite simple, and permits
obtaining coordinate functions in the Kantorovich method which
satisfy the differential equation resulting from that method and
the boundary conditions. Application of the demonstrated proce-
dure is explained via the example of the problem of finding the
stationary temperature field of a finite, hollow, thermally con-
ducting cylinder.
1/1

CIRC ACCESSION NO--AP0125456

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE PAPER PRESENTS THE RESULTS OF
  USE OF JET INJECTORS FOR IMMUNIZATION AGAINST SMALLPOX EXPERIMENTALLY IN
  ANIMALS AND IN A SMALL GROUP OF VOLUNTEERS. IMMUNOLOGIC RESPONSE WAS
  STUDIED BY DETERMINATION OF HUMORAL ANTIBODY IN THE BLOODS OF VACCINATED
  PEOPLE AND ANIMALS. AUTOMATIC MULTIDOSE INJECTORS OF NATIONAL AND
  AMERICAN MAKE WERE USED FOR IMMUNIZATION. THE METHOD OF INOCULATION WAS
  FOUND TO BE SAFE AND TO PRODUCE ANTIBODY RESPONSE IN SERA OF IMMUNIZED
  ANIMALS. IMMUNIZATION WITH JET INJECTOR PROTECTED RABBITS FROM DEATH
  AFTER INTRACEREBRAL INJECTION OF 1000 LD SUB50 OF NEUROVACCINE. A
  SIGNIFICANT RISE OF TITERS OF ANTIHEMAGGLUTININS AND VIRUS NEUTRALIZING
  ANTIBODY WAS DEMONSTRATED IN SERA OF VACCINATED HUMAN VOLUNTEERS.
   FACILITY: MOSKOVSKIY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT VIRUSNYKH
  PREPARATOV.

UNCLASSIFIED

1/2   021   UNCLASSIFIED   PROCESSING DATE--30OCT70
TITLE--USE OF INJECTORS FOR IMMUNIZATION AGAINST SMALLPOX. COMMUNICATION
  II: IMMUNOLOGIC RESPONSE TO INTRADERMAL INOCULATION OF SMALLPOX VACCINE
AUTHOR-(05)-AKATOVASHELUKHINA, E.M., FEDOROV, V.V., CHIMISHKYAN, K.L.,
  GURVICH, E.B., NEKRASOV, I.L.
COUNTRY OF INFO--USSR

SOURCE--VOPROSY VIRUSOLOGII, 1970, NR 3, PP 313-316

DATE PUBLISHED-------70

SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES

TOPIC TAGS--SMALLPOX, IMMUNIZATION, ANTIBODY, VACCINE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
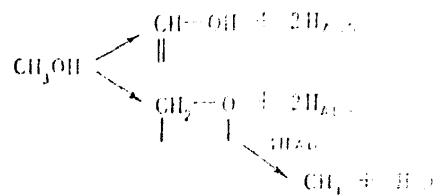PROXY REEL/FRAME--2000/1845   STEP NO--UR/0402/70/000/003/0313/0316

CIRC ACCESSICN NO--AP0125456
                          UNCLASSIFIED

USSR

AKATOVA, S. E., et al, Vestnik Moskovskogo Universiteta, Seriya II, Khimiya, no. 6, vol. 11, Nov-Dec 70, pp 714-718

most released from oxygen and not as yet completely occupied by hydrogen. The absence of potential displacement with methanol introduction (Fig. 1) in this case may be explained by the fact that the hydrogen according to dehydrogenation is consumed for hydrogenating one of the strongly adsorbed products thus compensating the antishift shift of φ_r toward the cathode. A possible arrangement based on the assumption of self-hydrogenation of a chemically adsorbed aldehyde which takes from the cleavage of two hydrogen atoms on methanol dehydrogenation is given by:

$$CH_3OH \Big\langle \begin{array}{l} CH-OH + 2H_{ads} \\ \parallel \\ CH_2-O + 2H_{ads} \\ \quad \searrow _{3H_{ads}} \\ \qquad CH_4 + H_2O \end{array}$$

2/2

- 3 -

USSR   UDC: 546.92

ALATOVA, S. R., BOGDANOVSKIY, G. A., and VOVCHENKO, G. D., Department of
General Chemistry, Moscow State University

"Adsorption of Methanol on Osmium"

Abstract: The adsorption of methanol on finely crushed osmium powder in a
solution of 0.1 N. H_2SO_4 using the direct contact method (as described in
an earlier study) has revealed significant differences in the behavior of
methanol as compared to that on other platinum metals. On contact of
methanol with osmium powder polarized to the value of a potential providing
a two-layer region($\phi \approx 0.3$ v), there is no shift in potential toward the
negative side for a few hours as it generally occurs on other platinum
metals. Based on experimental data, this study suggests that optimum con-
ditions for methanol dehydrogenation on osmium are those at a potential
close to 0.2 v where the centers at which dehydrogenation takes place are

1/2

USSR

UDC 615.1.012.6.078

KIYANSKAYA, L. A., SYSOYEV, Yu. P., and ARATOVA, N. S., Leningrad Branch, All
Union Scientific Research Institute of Medical Instrument Building, and Control
Institute of Medical and Biological Preparations imeni L. A. Tarasevich.

"The Fluorometric Method for Determining the Concentration of Microbial Cells
in Suspensions"

Abstract: The principle of fluorescent staining was used to determine the
concentration of cells in suspensions. It was noted that after exposure to
ultraviolet light, a suspension of microbial cells labeled with a luminescent
dye luminesces with an intensity directly proportional to the concentration of
the microbes in the range of $5 \cdot 10^7$ -- $20 \cdot 10^7$ cells per ml. The shape and size
of the microorganisms do not affect this relationship.

1/1

USSR

UDC 575.576.8

GOL'DFARB, D. M., CHERNIN, L. S., GOL'DBERG, G. I., AKATOVA, M. S., and GUKOVA, L. A., Institute of General Genetics, Academy of Sciences USSR, Moscow

"Some Properties of the EPAI [Influence of the Aftereffect of Nitrogen Mustard] Depression Factor Produced by Male Strains of Escherichia Coli K-12"

Moscow, Genetika, Vol 6, No 10, Oct 70, pp 107-114

Abstract: Experiments were conducted to determine whether the inhibition factor affects macromolecular ... oses in F⁻ cells of E. coli, how the factor alters the recombination frequency during conjugation of Hfr x F⁻, transduction, and the transfer effectiveness of the RTF episome. New data are presented which character- ize the ability of fertile strains of E. coli to produce the factor in a medium. It was also established that isolated F-fibers of male strains, which possibly exist in active filtrates of such strains, cannot inhibit EPAI. It was found that the factor causes partial inhibition of the synthesis of desoxyribonucleic acid in healthy F⁻ cells out has no effect on the synthesis of protein and ribonucleic acid. The factor contributes to the formation of a state of competence of F⁻ cells during conjugation. Removal of the factor from the mixture does not bring about a reduction in the yield of recombinats if recipient strains of type uvr⁻ are used.

1/1

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·USSR·

process which determines the frequency shift of the laser emission in time. Joule heat determines the frequency shift with durations on the order of several microseconds; however, with small currents and with such durations, the shift is linear. The mechanism of the strong frequency shift which was observed during use of short pulses is not yet clear, but the small relaxation time makes it possible to assume that it has an electronic character. The phenomenon requires further experimental and theoretical investigation. 3 fig. 4 ref. Received by editors, 18 May 1971; in final rewording, 8 July 1971.

2/2

USSR .

RYSAKOV, V.M., AKATOV, L.L. [Institute Of Semiconductors, Academy Of Sciences, USSR, Leningrad]

"Dynamics Of Emission Spectrum Of A Semiconductor Gallium Arsenide Laser"

Abstract: A number of papers discuss the change in time of the emission spectrum of a GaAs crystal laser using pulses with a duration on the order of one microsecond. However, up to now the results of various authors differ somewhat and this effect does not have an unambiguous explanation. In the present work emission of considerably shorter pulses (150 nanosec) is investigated, which makes it possible to obtain some new characteristics of this process. The device used consisted of a GaAs crystal laser (commercial-type diffused laser crystals of type "Kolibr" were used), the temperature of which can be changed in the limits 100--300° K, a pulse supply unit, and a screen monochromator. The resolution of the monochromator is on the order of 1 Å. The investigations were conducted with currents across the crystal of 30--100 a, i.e, close to those ordinarily used in standard semiconductor lasers, considerably exceeding the threshold. The results obtained (linear dependence of the speed of motion on the current and presence of two relaxation times) show that with short pulses, even with large currents, heating up of the crystal by Joule heat is not a basic
1/2

USSR
UDC 615:372:576.8:2.23].012.8

KHAVKIN, Yu. A., AKATOVA, E. N., and VOROB'YEV, A. A., Ufa Institute of
Vaccines and Sera imeni Mechnikov

"A Method of Obtaining Highly Purified Diphtheria Toxin"

Abstract: A new method of producing large quantities of pure diphtheria toxin
is described. The method includes removal of porphyrin and other ballast sub-
stances from the crude toxin through adsorption on charcoal; a 50-70-fold con-
centration of the filtrate by ultrafiltration through molecular sieves; separa-
tion of the ultrafiltrate (2-3% proteins) into three fractions on sephadex gel
columns; elimination of two fractions through precipitation with ammonium
sulfate; and purification of the middle-peak fraction through sephadex ion-
exchange chromatography. The product has a specific activity of 2,700-3,400
Lf/mg of total nitrogen and 40-50 MLD/Lf. It contains no admixtures of
somatic antigens and is homogeneous, as indicated by electrophoresis in poly-
acrylamide, ultracentrifugation, thin-layer gel filtration, and precipitation
in agar. The purified toxin is composed of four to six discrete components
with isoelectric points at a pH of 4.5-5.0. All the components have toxic
and nuclease properties and are neutralized and precipitated with pure anti-
toxin.
1/1

USSR

AKATOV, A. K., et al, Zhurnal Mikrobiologii Epidemiologii i Immunobiologii,
No 5, May 71, pp 58-62

cytosis. The results are analyzed with reference to Roger's hypothesis (1963)
on the correlation between virulence of Staphylococci and their ability to form
capsules in vivo.

2/2

- 19 -

USSR

UDC 576.851.252.097.21:576.851.252.094

AKATOV, A. K., KATS, L. N., and PROKHOROV, V. Ya., Institute of Epidemiology and Microbiology imeni Gamalea, USSR Academy of Medical Sciences, and Institute of Medical and Biological Problems, USSR Ministry of Health, Moscow

"A Possible Correlation Between the Virulence of Staphylococci and Some Characteristics of Their Submicroscopic Structure"

Abstract: Experimental infection was produced in white mice by intraperitoneal injection of four Staphylococcus strains which were similar biologically but differed in virulence. Virulent strains survived in the abdominal cavity as a result of their incomplete phagocytosis, while Staphylococci of low virulence were subject to intensive destruction by phagocytes. Electron microscopy revealed no morphological differences among the four strains cultured in vitro. However, a significant difference was found among Staphylococci grown in vivo. Each cell of the virulent strain was surrounded by a distinct microcapsule, while strains of low virulence showed only traces of such capsules. It is suggested that formation of microcapsules in vivo is one factor responsible for the increased resistance of Staphylococcus to complete phago-

1/2